

## Claims

Sub 12

1. Data acquisition module for modular data acquisition system, comprising:

5 connecting means on a first side for removably inserting the module in a slot of said modular acquisition system,

at least one acquisition channel, each channel comprising at least one analog-to-digital converter for converting an analog input signal into a digital signal,

10 at least one clock generating circuit capable of supplying an internal clock signal,

wherein at least one connector makes it possible to plug in a removable connecting element on a second external side of said module different from the first side in order to connect said module to a synchronization bus connecting several modules in said system, said connection  
15 being effected independently from the insertion of said module into said slot,

and wherein a clock selecting circuit allows the selection of either a slave-clock state, in which said converters are synchronized by said synchronization bus, or of a master-clock state in which these converters  
20 are synchronized by said internal clock signal that is also used as external synchronization signal on said synchronization bus.

2. The module of claim 1, wherein said clock generating circuit comprises a phase lock loop (PLL), a clock reference signal being applied at the input of said PLL,

25 and wherein said internal clock signal is a signal downstream of said PLL.

3. The module of claim 1, wherein a delay element enables the external synchronization signal received from the synchronization bus to be delayed.

5 4. The module of claim 3, wherein the delay applied by said delay element can be programmed.

5. The module of claim 1, wherein said connector comprises a trigger input for transmitting at least one trigger signal between adjacent modules.

10 6. The module of claim 5, wherein at least one trigger generating circuit enables a trigger signal to be generated in response to a predefined event on one of the acquisition channels.

7. The module of claim 6, wherein a trigger selecting circuit makes it possible to impose on said synchronization bus the trigger signal supplied by said trigger generating circuit.

15 8. The module of claim 1, wherein said external synchronization signal can momentarily be interrupted.

9. The module of claim 8, wherein said external synchronization signal can be interrupted according to the state of said trigger signal.

20 10. The module of one of the preceding claims, wherein said clock selecting circuit can be controlled by signals applied on said connecting means.

11. The module of claim 5, wherein said delay element can be controlled by signals applied on said connecting means.

25 12. The module of claims 7, wherein said trigger selecting circuit can be controlled by signals applied on said connecting means.

13. The module of claim 1, wherein said connector makes it possible to simultaneously plug in two removable connecting elements enabling said external synchronization signal and/or said trigger signal to be transmitted from or to two adjacent modules in said modular acquisition system.

14. The module of claim 1, wherein at least one acquisition channels comprises:

at least a demultiplexer for demultiplexing the signal supplied by said analog-to-digital converter,

at least a memory element for storing the demultiplexed signal supplied by said demultiplexer,

and wherein said trigger generating circuit is connected at the output of the demultiplexer.

15. The module of claim 1, wherein it conforms to the PCI standard,

and wherein said connector is placed on said second side on the front of said module that can be accessed by the user when said module is mounted in said modular acquisition system.

16. The module of claim 1, wherein it conforms to the CompactPCI standard,

and wherein said connector is placed on said second side on the front of said module that can be accessed by the user when said module is mounted in said modular acquisition system.

17. The module of claim 1, wherein it conforms to the PXI standard,

and wherein said connector is placed on said second side on the front of said module that can be accessed by the user when said module is mounted in said modular acquisition system.

5 18. The module of claim 1, wherein it conforms to the VXI standard,

and wherein said connector is placed on said second side on the front of said module that can be accessed by the user when said module is mounted in said modular acquisition system.

10 19. The module of claim 1, wherein said external synchronization signal is a differential signal.

20. The module of claim 1, wherein said external synchronization signal is a signal of the type ECL.

21. The module of claim 1, wherein several phase-shifted external synchronization signals can be transmitted on said bus.

15 22. Modular data acquisition system, wherein

a plurality of modules according to claim 1 are connected two by two by connecting elements comprising each a first series of pins plugged in a connector on said second front side of a first acquisition module and a second series of pins plugged in a connector on said second front side of a  
20 second acquisition module.

23. The modular system of claim 22, further comprising a clock module for supplying an external synchronization signal to one or several modules in a modular data acquisition system, wherein said clock module comprises:

25 connecting means for removably inserting the clock module in a slot of said modular acquisition system,

at least one clock generating circuit capable of supplying an external synchronization signal,

at least one connector for plugging in a removable connecting element on one of said second external sides of said clock module in order to transmit said external synchronization signal on a bus connecting adjacent modules in said modular acquisition system.

24. The modular system of claim 22, further comprising a trigger module for supplying a trigger signal to one or several modules in a modular data acquisition system, wherein said trigger module comprises:

connecting means for removably inserting the trigger module in a slot of said modular acquisition system,

a trigger generating circuit capable of generating a trigger signal in response to a predefined event on an acquisition channel of the modular acquisition system,

at least one connector for plugging in a removable connecting element on one of said second external sides of said trigger module in order to transmit a trigger signal on a bus connecting adjacent modules in said modular acquisition system.

25. The modular system of claim 24, wherein said connector makes it possible to simultaneously plug in two removable connecting elements enabling said trigger signal to be transmitted to two adjacent modules in said modular acquisition system.

26. The modular system of claim 24, wherein said trigger module comprises an acquisition channel comprising:

at least an analog-to-digital converter,

at least a demultiplexer for demultiplexing the signal supplied by said analog-to-digital converter,

at least a memory element for storing the demultiplexed signal supplied by said demultiplexer,

5 and wherein said trigger generating circuit is connected at the output of said demultiplexer.

27. The modular system of claim 22, wherein said removable connecting element comprises:

10 a printed circuit board comprising a plurality of paths enabling said pins of the first series to be electrically connected with said pins of the second series,

at least a protrusion designed to be plugged in one of said acquisition modules so as to prevent said removable connecting element from turning.

15 28. The modular system of claim 27, wherein said connection element comprises a housing of plastic material encasing said printed circuit board.

29. The modular system of claim 22, wherein it comprises at least one connecting element provided with at least one terminating impedance electrically connected between one of said pins and an earth signal, the value of said terminating impedance being about equal to the line impedance of the signal traveling through the pin in question.

25 30. The module system of claim 29, wherein the shape of said connecting element with at least one terminating impedance does not allow it to be plugged in between two other connecting elements.